Project	**IEEE 802.16 Broadband Wireless Access Working Group** <http://ieee802.org/16>
Title	**Proposal for IEEE 802.16m Protocol Structure**
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Re:	IEEE 802.16m-07/047, “Call for Contributions on Project 802.16m System Description Document”. In response to the following topics: • Proposed 802.16m Protocol Architecture and main functionalities per protocol layer
Abstract	This contribution introduces the adaptive frequency reuse technique and discusses its benefit to IEEE 802.16m system
Purpose	For discuss and approval by TGm
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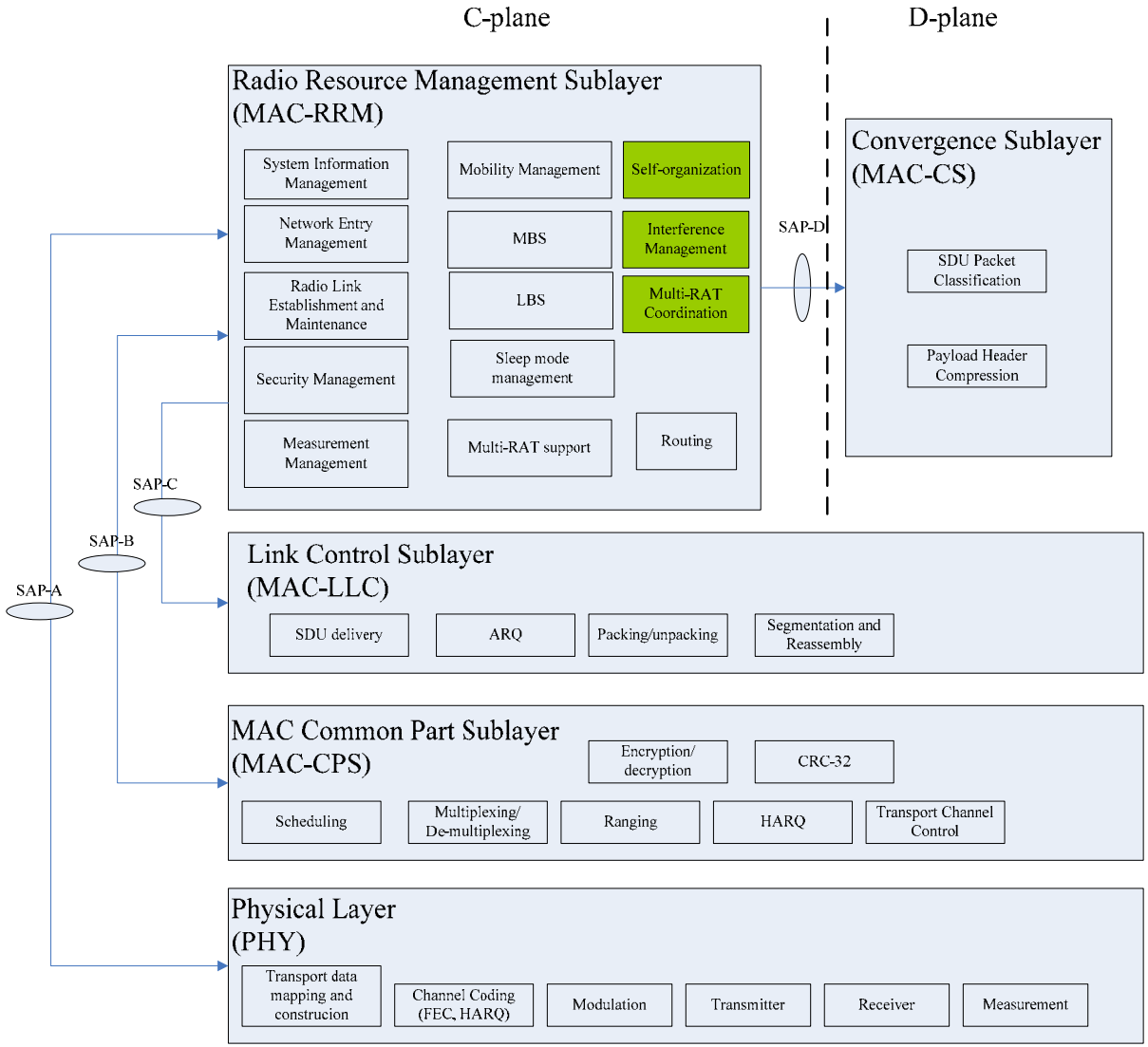
Patent Policy	The contributor is familiar with the IEEE-SA Patent Policy and Procedures: <http://standards.ieee.org/guides/bylaws/sect6-7.html#6> and <http://standards.ieee.org/guides/opman/sect6.html#6.3>. Further information is located at <http://standards.ieee.org/board/pat/pat-material.html> and <http://standards.ieee.org/board/pat>.

Protocol Structure



What's New

- Enhanced system information broadcasting
  - Tree-like system information structure
    - Shorten the packet size of system information
    - Update the system information dynamically
    - Enhance the power saving
  - More system information
    - Multi-RAT, micro/macro-cells….
- Enhanced measurement report
  - More measurement reports should be designed
    - for advanced RRM (sec. 6.4.1, SRD)
    - for location-based service (sec. 6.8, SRD)
- Additional shared UL channel
  - Hasten the transmission of uplink short-burst data
- Enhanced Handoff mechanism

RRM Sublayer (1/6)

- System Information Management
  - Broadcast system configuration
    - Basic information of a cell
      - BSID, cell type…
    - DL/UL channel descriptions
    - Parameters for mobility management
      - neighboring BS/RS information
    - Parameters for location management
      - AOA, TDOA…
    - Parameters for traffic control
- Network Entry Management
  - Service capability negotiation
  - Terminal capability negotiation
  - MS registration

RRM Sublayer (2/6)

- Radio Link Establishment and Maintenance
  - Initial ranging
  - Periodic ranging
  - Establishment and termination of service connections
  - Parameter negotiation of LLC sublayer
  - power control
- Security Management
  - Authentication
  - Security key management

RRM Sublayer (3/6)

- Measurement Management
  - RSSI/ CINR monitoring
    - service cell and neighboring cells
    - Inter-FA and intra-FA
  - Interference monitoring
  - Position updating
    - Location, moving trajectory…
  - Traffic Volume reporting
    - Buffer status
    - Average delay/delay jitter…
  - Channel quality reporting

RRM Sublayer (4/6)

- Mobility Management
  - Handover
  - Idle mode
  - Scan
    - Intra-FA
    - Inter-FA
    - Inter-RAT
  - Cell selection/reselection
- MBS
  - Support of multicast and broadcast service
- LBS
  - Support of location-based service

RRM Sublayer (5/6)

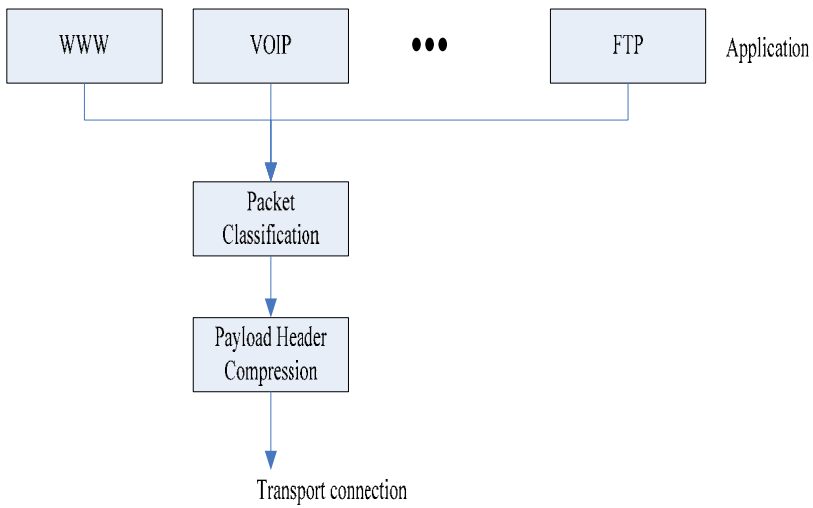
- Sleep mode management
  - Activation and deactivation of the sleep mode
- Routing
  - Multiple-hop transmission
- Multi-RAT support
  - 802.16m
  - 802.16e
  - WCDMA
  - …

RRM Sublayer (6/6)

- Self-organization
  - Re-organize the reuse of frequency/subcarrier
  - Adjust cell coverage.
  - Purpose: load balance, flexible cell planning…
- Multi-RAT coordination
  - Inter-RAT handover
  - MIH
- Interference management
  - Mitigate the adjacent channel/co-channe interference from other RAT or BS
  - Manage the adjacent channel/co-channe interference from other RAT or BS

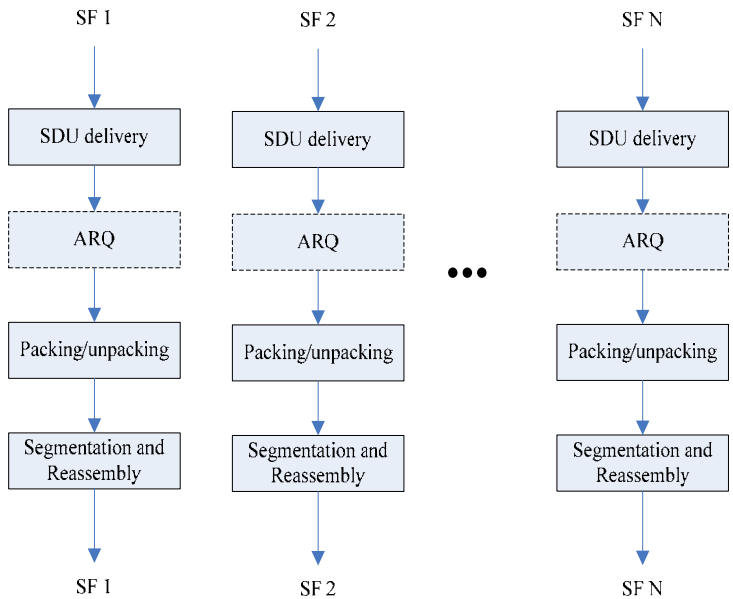
Convergence Sublayer

- SDU packet classification
  - Map an application SDU into a specific transport connection.
- Payload header suppression
  - ROHC…



Link Control Sublayer (1/2)

- SDU delivery
  - Deliver the successfully received SDU to the upper sublayer.
- ARQ
  - Make sure the SDUs are successfully transmitted to the peer side.
  - Maintain the ARQ control mechanism.

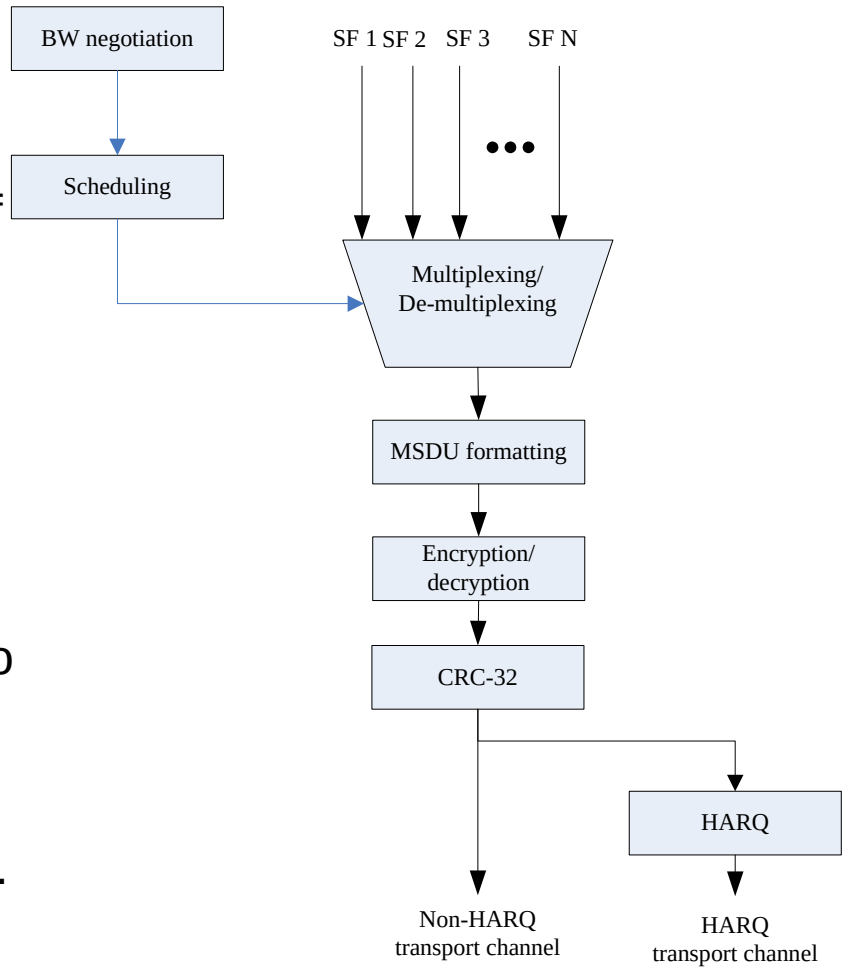


Link Control Sublayer (2/2)

- Packing/unpacking
  - Concatenate small SDUs into a larger PDU.
  - Disassemble the received PDU into SDUs according to their original packet sizes.
- Fragmentation/de-fragmentation
  - Fragment a large SDU into a series of smaller ones.
  - De-fragment the received PDUs into a complete SDU.

MAC Common Part Sublayer (1/2)

- Scheduling
  - Solicit transmission grant from BS.
  - Decide the transmission eligibility of logic channels, based on QoS parameters and channel priority.
- Multiplexing/De-multiplexing
  - Multiplex PDUs from multiple logic channels into a PHY transport channel.
  - Extract the received data blocks into logic channel PDUs.
- Encryption/Decryption
  - Encrypt the PDUs to be transmitted.
  - De-crypt the received PDUs.



MAC Common Part Sublayer (2/2)

- Ranging
  - Adjust the power/time/frequency offset.
- HARQ
  - HARQ reordering and window control.
  - HARQ retransmission buffering.
- Transport Channel Control.
  - Configure the transmission parameters of PHY transport channel.

SAPs

- SAP-A
  - MAC-RRM ➔ PHY
    - Configure PHY operational parameters
  - PHY ➔ MAC-RRM
    - Report PHY measurement
- SAP-B
  - MAC-RRM ➔ MAC-CPS
    - Configure the QoS parameters for service flows
    - Configure HARQ Rx/Tx parameters
    - Configure the encryption parameters
  - MAC-CPS ➔ MAC-RRM
    - Report the transmission statistics

SAPs

- SAP-C
  - MAC-RRM ➔ MAC-LLC
    - Configure the ARQ parameters
- SAP-D
  - MAC-RRM ➔ MAC-CS
    - Configure PHS rules and header compression